

Applicant: Akira Sakaigawa, et al.
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REMARKS

Applicants appreciate the Examiner's thorough examination of the subject application and request reconsideration of the subject application based on the foregoing amendments and the following remarks.

Claims 1-10 are pending in the subject application.

Claims 1-10 stand rejected under 35 U.S.C. §103.

Claim 1 is amended to more distinctly claim Applicant's invention.

The amendments to the claims are supported by the originally filed disclosure. It also is respectfully submitted that the amendment(s) to the claims do not require further search and consideration and thus, entry of these amendments into the subject application is respectfully requested.

35 U.S.C. §103 REJECTIONS

Claims 1-10 stand rejected under 35 U.S.C. §103 as being unpatentable over Masc et al. [USP 5,666,173; "Masc"] in view of Asao et al. [USP 6,195,147; "Asao"]. Applicants respectfully traverses as discussed below. Because claim 1 was amended in the instant amendment, the following discussion refers to the language of the amended claim, however, only those amended features specifically relied upon to distinguish the claimed invention from the cited prior art shall be considered as being made to overcome the cited reference.

Applicants claim, claim 1, a liquid crystal optical apparatus that includes a pair of substrates, a liquid crystal layer provided between the pair of substrates, a plurality of first

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electrodes provided on one of the pair of substrates, and at least one second electrode provided on the other of the pair of substrates. The liquid crystal layer also is formed of a liquid crystal material in which an aligning direction of liquid crystal molecules continuously changes in accordance with a voltage applied thereto. Further, a frame period for applying a signal to the liquid crystal layer includes a first period and a second period that follows the first period.

In the first period a voltage is applied to the at least one second electrode, and a write signal which may vary in voltage relative to a write signal in a preceding frame period for writing information to the liquid crystal layer is applied to one of the plurality of first electrodes to obtain a desired aligning direction of the liquid crystal material. In the second period, a voltage is applied to the at least one second electrode, and a reset signal which varies in voltage in accordance with the voltage of the write signal applied to one of the plurality of first electrodes in the first period is applied to the one of the plurality of first electrodes for deleting the information written in the liquid crystal layer in the first period.

The present invention results from the recognition by Applicants/ inventors that it is more preferable to apply a voltage for writing information to a liquid crystal layer in one frame and then apply a voltage deleting the information to the liquid crystal layer in the same frame. In contrast (see subject application at page 9, lines 10-17), with prior art systems a voltage is applied for deleting information to the liquid crystal layer in one frame and a voltage is then applied for writing information to the liquid crystal layer in the same frame. As also described in the subject application, with conventional techniques a reset or blank pulse is provided to a pixel electrode prior to the writing signal, whereas in the present invention a writing signal is provided

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to the pixel electrode *prior* to the reset or blank pulse.

Figures 22A-D of Assao illustrates what a so called writing signal followed by a reset signal. As was previously indicated by Applicants, the writing signal has a voltage V_s and the reset signal is a voltage signal $-V_s$ and the liquid crystal material is bistable (see Assao col. 29, lines 59-64). Therefore and in contrast to the present invention, in Assao the so-called writing signal simply turns the pixel on and the reset signal merely turns the pixel off.

Also, in Assao there is no variation of the voltage level of the writing signal and the reset signal in order to control grayscale. Instead, Assao teaches controlling grayscale by changing a ratio between the two memory states (*i.e.*, On and Off). In other words, the principal of gray-scale display in Assao is to perform a gray-scale display by means of continuously changing a ratio between two domain areas, that is a diagonally shaded region and diagonally non-shaded region as clearly shown in Fig. 4 of Assao.

The present invention, a gray-scale display is provided by continuously changing an angle disposed between a molecular axis of a ferroelectric liquid crystal and a polarization axis upon having only one memory state as shown in Fig. 4 of the subject application. In this situation, the gray scale region is uniformly varied for the whole region of a pixel, but not to change in configuration of domain.

With reference to the comparative example described in the subject application, a reset voltage is applied in an initial sub-frame and a data writing drive is conducted in the next sub-frame. As shown in Fig. 6, the getting-back time of molecules becomes long since a voltage of writing-in in the initial frame is different from a voltage of resetting the next frame. In contrast

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and with reference to Fig. 5 of the subject application, this problem is overcome by driving in such a manner that data is written-in in the initial sub-frame and a reset voltage is applied in the next frame.

Moreover, Assao does not provide any discussion as to how to solve the problem, how to and in what order to load a reset voltage and a writing-in voltage in a device conducting a grayscale display to change continuously an angle between a molecular axis and a polarization axis of a ferroelectric crystal upon maintaining only one memory state.

Accordingly, Assao does not teach or suggest a driving technique in which a write signal having a voltage corresponding to a desired grayscale is followed by a reset voltage signal having a voltage corresponding to the voltage of the write signal. As indicated above, Assao merely teaches achieving grayscale by changing the ratio of the ON/OFF states of the liquid crystal material. It also is respectfully submitted that it would not have been obvious to anyone skilled in the art to modify the device as taught in Masc based on the teaching to yield the invention as claimed by Applicants. Using a variable voltage write signal and reset signal in the device as described in Assao would depart completely from the type of device that it is, namely a bistable device in which the pixels are turned on/off and grayscale is provided based on the ratio.

Applicants respectfully submit that the present invention is different in scope and effect from that which would be realized by the combination of Masc and Assao. Notwithstanding this, and in the interests of advancing prosecution, Applicants have amended claim 1 for clarity and to emphasize those points of distinction provided in Applicants' previously filed response. More specifically, claim 1 was amended to clearly indicate that the voltage of the write signal can vary

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and that the voltage of the reset signal is varied in accordance with the voltage of the write signal. Further claim 1 was amended to indicate that the voltage of the reset signal varies in accordance with the voltage of the preceding write signal.

Each of claims 2-10 depends directly or ultimately from claim 1. Thus, each of claims 2-10 are believed to be allowable at least because of their dependency from a base claim that is believed to be allowable.

As provided in MPEP 2143.01, obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. *In re Fine*, 837 F. 2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F. 2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). As provided above, the references cited, alone or in combination, include no such teaching, suggestion or motivation.

Furthermore, and as provided in MPEP 2143.02, a prior art reference can be combined or modified to reject claims as obvious as long as there is a reasonable expectation of success. *In re Merck & Co., Inc.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Additionally, it also has been held that if the proposed modification or combination would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. Further, and as provided in MPEP-2143, the teaching or suggestion to make the claimed combination and the reasonable suggestion of success must both be found in the prior art, not in applicant's disclosure. *In re Vaack*, 947 F.2d

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488, 20 USPQ2d 1438 (Fed. Cir. 1991). As can be seen from the forgoing discussion regarding the disclosures of the cited references, there is no reasonable expectation of success provided in any of the references.

As the USPTO Board of Patent Appeals and Interferences has held, "The mere fact that a worker in the art could rearrange the parts of the reference device to meet the terms of the claims on appeal is not by itself sufficient to support a finding of obviousness. The prior art must provide a motivation or reason for the worker in the art, without benefit of appellant's specification, to make the necessary changes in the reference device." *Ex parte Chicago Rawhide Mfg. Co.*, 223 USPQ351, 353 (BD. Pat. App. & Inter. 1984).

As the Federal circuit has stated, "[t]he mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification." *In re Fritch*, 972 F.2d 1260, 1266, 23 USPQ2d 1780, 1783-84 (Fed. Cir. 1992). Obviousness may not be established using hindsight or in view of the teachings or suggestions of the inventor. *Para-Ordnance Mfg. v. SGS Importers Int'l, Inc.*, 73 F.2d 1085, 1087, 37 USPQ2d 1237, 1239 (Fed. Cir. 1995).

It is respectfully submitted that for the foregoing reasons, claims 1-10 are patentable over the cited reference(s) and thus, satisfy the requirements of 35 U.S.C. §103. As such, these claims are allowable.

It is respectfully submitted that the subject application is in a condition for allowance.
Early and favorable action is requested.

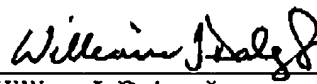
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Applicants believe that additional fees are not required for consideration of the within Response. However, if for any reason a fee is required, a fee paid is inadequate or credit is owed for any excess fee paid, the Commissioner is hereby authorized and requested to charge Deposit Account No. 04-1105.

Respectfully submitted,
Edwards & Angell, LLP

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